

NEW OR LITTLE-KNOWN TIPULIDAE FROM MIDDLE AMERICA (DIPTERA). I

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I am honored in being able to provide a paper in the present issue of the *Great Basin Naturalist* which commemorates the work of Professor Vasco M. Tanner during the past thirty years. As founder and leader in the work of the *Naturalist* Professor Tanner has the thanks and appreciation of many botanists and zoologists who have been interested in the life of the American West. Since its founding, Professor Tanner has published many of his own studies in the *Naturalist*, covering a surprising range of subjects, including the herpetology of Eastern Asia, many of the Pacific islands, and a number of contributions to insect ecology and biology. His principal work in insect taxonomy has been with the Coleoptera, primarily weevils; however, further work includes papers on the Cicindelidae and Tenebrionidae. A further indication of the breadth of his interests is his account of the life of Linnaeus at the Linnean Bicentennial in 1958.

I became associated with the *Naturalist* shortly after its founding, between 1943 and 1968, publishing therein a total of fourteen papers on the Diptera. The initial series of four papers was entitled "Undescribed species of Western Nearctic Tipulidae (Diptera)," appearing in volume 4, 1943. There were three additional parts under this title, the fourth and last in volume 21, 1961. At that time it was felt advisable to widen the scope of this series and the title was changed to "Undescribed species of Nearctic Tipulidae" and so involved the entire region. Under this title a total of nine papers have appeared, the first in volume 21, 1961, the latest in volume 28, 1968. In addition to the above, one other article has been published, "A new net-winged midge from Idaho (Blepharoceridae, Diptera)," in volume 25, 1965. It may be stated that in the 1943 paper cited plans were laid for a detailed study of the crane flies of the Rocky Mountain and Pacific Coast states and provinces from Mexico to Alaska. It was believed that there might be in excess of 1000 species of these flies in this area, and it can be stated that this figure now has been exceeded.

Mrs. Alexander and I visited Provo once during June 1949. We greatly appreciated the beautiful campus and buildings of Brigham Young University and the opportunity of meeting certain of the faculty and students, including, in addition to Professor Tanner, his brother Wilmer W. Tanner, in ecology; Bertrand F. Harrison, in botany; C. Lynn Hayward, in zoology; and others. Following this brief visit to the campus on June 20 we spent the following two days at the Brigham Young University biological station near Aspen

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Grove, below Mount Timpanogos in the beautiful Wasatch Mountains. We met several faculty members and students at the station and appreciated a visit from Dr. George F. Edmunds, Jr., leading student of the Mayflies of Utah, who subsequently completed his Doctor of Philosophy thesis at the University of Massachusetts on that subject.

Again, may I express my deepest thanks and appreciation to Professor Tanner for a long and most profitable association and for his encouragement in entomological work. Mrs. Alexander and I join a host of other friends and associates in wishing Vasco and his wife many years of health and continued work on his favorite insect groups.

In the present paper I am discussing certain crane flies from various republics in Middle America, from Mexico to Panama. For these I am indebted to four of my former students at the University of Massachusetts: Dr. Thomas H. Farr of the Institute of Jamaica; Dr. Gordon Field of the University of Rhode Island; Dr. Oliver S. Flint, Jr., of the Smithsonian Institution, Washington; and Dr. Marion Estelle Smith of the University of Massachusetts. Their thoughtfulness and consideration in collecting these specimens are much appreciated. It should be noted that one of the included novelties is a very distinct species that is dedicated to Professor Tanner. Types of all the species are preserved in the Alexander Collection.

TIPULINAE

Zelandotipula serratimargo, n.sp.

General coloration of thoracic dorsum pale brown, inconspicuously patterned, including four praescutal stripes; antennae uniformly pale yellow; thoracic pleura above broadly light yellow, with a more ventral brown stripe; femora yellow, tips brown, remainder of legs chiefly dark brown; wings pale brown, restrictedly variegated by darker areas, without a spot in cell *M*, veins behind *R* glabrous; male hypopygium with outer dististyle pale, broadly flattened, more expanded outwardly, the margin of outer half with coarse irregular teeth; lobes of ninth tergite very low, nearly transverse, margins with abundant setae, the more lateral ones shorter and more spinoid.

MALE.—Length about 18 mm; wing 19 mm; antenna over 4.5 mm.

Frontal prolongation of head obscure yellow above, pale brown on sides, nasus very long, slightly decurved; palpi with proximal three segments dark brown, terminal segment obscure brownish yellow, apex slightly darker. Antennae (outer segments broken) light yellow; flagellar segments cylindrical, verticils very short. Head yellow above, sides of vertex brown, more widened behind.

Pronotum light yellow, narrowly dark brown medially and on sides. Mesonotal praescutum light brown, the very restricted ground paler than the four discal stripes, the latter broadly margined by slightly darker brown; scutum almost uniformly obscure brownish

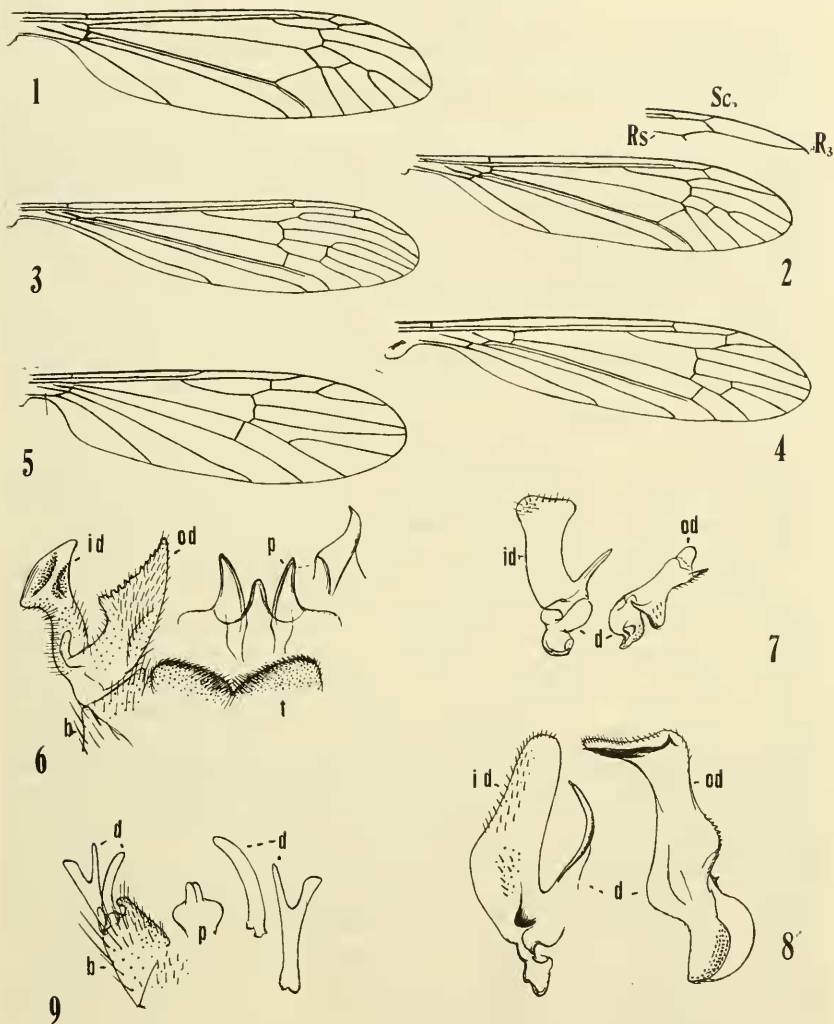
yellow, the suture clearer yellow; scutellum brownish yellow with sparse yellow setae; mediotergite brownish yellow, with sparse weak setae, pleurotergite pale brown posteriorly, ventral half yellowed. Pleura dorsally broadly light yellow, including the dorsopleural membrane, becoming more diffuse behind, reaching the abdomen; more ventrally with a brown longitudinal stripe extending from the cervical region across the pronotal scutum to the pleurotergite, paler and more diffuse behind; ventral pleura chiefly light yellow, sternopleurite vaguely lined with very pale brown. Halteres with stem obscure yellow, knob weakly more darkened, apex obscure yellow. Legs long; fore coxae weakly brownish yellow, remaining coxae and all trochanters yellow; femora yellow, tips brown, remainder of legs dark brown, bases of tibiae narrowly pale; claws with a strong tooth before midlength. Wings chiefly pale brown, prearcular and costal fields, the stigma, basal half of outer radial field and cell 1st M_2 slightly darker brown; small and very inconspicuous still darker brown marks at origin of R_s and posterior end of $m-cu$; restricted whitened obliterative areas cephalad and basad of stigma; no darkening in cell M ; extreme posterior wing border in medial and cubital cells slightly darkened; a whitened marginal dash in cell 1st A before vein 2nd A ; veins brown, whitened in the obliterative areas at cord. Longitudinal veins behind R glabrous. Venation: Free tip of Sc_2 stout, longer than vein R_1 beyond it; vein R_3 beyond midlength subangular; petiole of cell M_1 and m subequal; $m-cu$ shortly before fork of M_{3+4} .

Abdominal tergites light brown, obscure yellow laterally, posterior borders light brown, sternites more uniformly yellowed; hypopygium yellowed, including the appendages. Male hypopygium (Fig. 6) with ninth tergite, t , with lobes very low, their margins almost transverse, with numerous setae that are directed mesad, the outer ones shorter and stouter, slightly spinoid, inner setae longer and more delicate. Outer dististyle (shown at right in figure, as mounted on slide), od , broadly flattened, more expanded outwardly, outer half with margin oblique, coarsely and irregularly toothed, as shown; inner style, id , with the blackened spinoid setae or pegs arranged in two separate groups, the outer one with about 60 pegs, somewhat fewer in the inner or lower group, including a marginal series on a low elevated flange, base of style with abundant but inconspicuous long yellow setae. Phallosome, p , with apophyses longer than the aedeagus, appearing as short horns.

HABITAT.— Guatemala.

HOLOTYPE.— ♂, Panajachel, Lake Atitlan, July 24-27, 1966 (M. E. Smith); in vegetation in pool at foot of waterfall, several hundred feet above lake along highway.

The present fly in general appearance is most similar to species such as *Zelandotipula diducta* (Alexander), Ecuador; *Z. flavicornis* (Alexander), Venezuela; *Z. flavogenualis* (Alexander), Peru; *Z. lassula* (Alexander), Ecuador, and *Z. tuberculifera* (Alexander), Peru. All of these differ among themselves in details of coloration



EXPLANATION OF FIGURES

Fig. 1. *Tipula (Bellardina) flinti*, n.sp.; venation.

Fig. 2. *Tipula (Eumicrotipula) estella*, n.sp.; venation.

Fig. 3. *Austrolimnophila (Austrolimnophila) subsestilis*, n.sp.; venation.

Fig. 4. *Shannonomyia semireducta*, n.sp.; venation.

Fig. 5. *Cheilotrichia (Empeda) tanneri*, n.sp.; venation.

Fig. 6. *Zelandotipula serratimargo*, n.sp.; male hypopygium.

Fig. 7. *Tipula (Bellardina) flinti*, n.sp.; male hypopygium.

Fig. 8. *Tipula (Bellardina) praelauta* Alexander; male hypopygium.

Fig. 9. *Cheilotrichia (Empeda) tanneri*, n.sp.; male hypopygium.

(Explanation of figures: Venation: Sc, Subcosta; R, Radius. Male hypopygium: b, basistyle; d, dististyle; id, inner dististyle; od, outer dististyle; p, phallosome; t, ninth tergite).

of the body and wings and especially in hypopygial structure, including the tergite, both dististyles, and the phallosome.

Tipula (Bellardina) flinti, n.sp.

Size large (wing of male over 18 mm); mesonotal praescutum light brown, disk with four blue-gray stripes; claws of male simple; wings chiefly pale yellow, vein *Cu* narrowly seamed with brown; male hypopygium with outer dististyle short and broad, the outer lateral spine short and spikelike; inner style widened at apex, appendage at base of blade a short straight point.

MALE.— Length about 19 mm; wing 18.5 mm; antenna about 3.8 mm.

Frontal prolongation of head obscure yellow, including nasus; mouthparts dark brown; palpi with basal segment obscure yellow, intermediate segments brown, the terminal one black. Antennae with proximal three segments yellow, succeeding two or three brownish black basally, apices narrowly more yellowed, outer segments uniformly black; basal enlargements of flagellar segments small, verticils somewhat shorter than the segments. Head obscure yellow, vertex heavily white pruinose; vertical tubercle small, simple.

Pronotum light brown, sides more yellow pollinose. Mesonotal praescutum with lateral and humeral regions light brown, disk chiefly covered by four blue-gray stripes, the intermediate pair nearly contiguous in front, narrowed and divergent behind, the enclosed central space light gray; scutal lobes light gray, each with two darker gray areas, central region brownish yellow; posterior sclerites of notum brownish yellow. Pleura chiefly brownish yellow, ventral sternopleurite gray, anepisternum very slightly darkened, propleura brown. Halteres with stem yellow, knob dark brown. Legs with coxae yellow, very faintly whitened, trochanters yellow; femora yellow, tips abruptly black; tibiae brownish yellow, gradually darkened at apices, tarsi passing into black; claws of male small, simple, in *praclauta* with a small tooth. Wings (Fig. 1) chiefly pale yellow, prearcular and costal fields, with the stigma, more saturated yellow; vein *Cu* in cells *Cu*₁ and *M* narrowly brown; veins brown, *Sc* more yellowed. Venation: Inner end of cell 1st *M*₂ acutely pointed; *m* nearly as long as petiole of cell *M*₁; *m-cu* long, slightly less than distal section of *Cu*₁.

Abdomen with basal two segments extensively yellowed, borders darkened, outer segments more uniformly dark brown, incisures narrowly yellowed, subterminal segments more uniformly dark brown, hypopygium yellowed. Male hypopygium (Fig. 7) generally as in *praclauta*, including the ninth tergite, ninth sternite and aedeagus. Dististyles, *d*, distinctive, outer style, *od*, short and broad, apex obtuse, the small outer lateral spine short; inner style, *id*, widened at apex, appendage at base of blade a short straight point. The male hypopygium of *praclauta* is shown for comparison (Fig. 8).

HABITAT.— Mexico.

HOLOTYPE.— ♂, Las Cruces National Park, Mexico D. F., on

Route 15 between Mexico City and Toluca, 3100 meters, July 13, 1966 (O. S. Flint, Jr.); along small stream with shrubby banks in grassy mountain meadow, among stands of *Abies religiosa* and *Pinus montezumae*.

The species is named for Dr. Oliver S. Flint, Jr., specialist on the Trichoptera and other orders of the neuropteroid insects. The most similar species is *Tipula* (*Bellardina*) *praelauta* Alexander, described from Oak Creek Canyon, Arizona, later found near Durango City, Mexico. The distinctive hypopygia of the two species are shown for comparison (Figs. 7 and 8). These flies are very different from all other species of the subgenus in the nature of the wing pattern and may be found to represent a new subgeneric group despite some marked similarities in the hypopygia.

Tipula (*Eumicrotipula*) *estella*, n.sp.

Size medium (wing of female 12.5 mm); antennae with scape and pedicel yellow, flagellum black; mesonotal praescutum yellow with four brown stripes, pleura almost uniformly light gray; legs brownish black to black, femoral bases narrowly yellow; wings with costal cell almost uniformly brown, remainder of wings chiefly yellowed, clouded with pale brown, especially in outer wing cells and in anal field; no trichia in wing cells; R_{1+2} atrophied, cell 1st M_2 large, M_{3+4} short.

FEMALE.—Length about 11.5 mm; wing 12.5 mm; antenna about 2 mm.

Frontal prolongation of head yellowish gray, including the nasus; palpi brownish black. Antennae with scape and pedicel light yellow, flagellum black, their proximal segments subcylindrical, slightly longer than their verticils, basal enlargements of outer segments more developed. Head very pale brown to yellowish brown, the narrow orbits and the front whitened, occiput light gray; posterior vertex with a narrow brownish black line from summit of the low vertical tubercle to the occiput.

Pronotal scutum gray, vaguely patterned with brown, scutellum clear light yellow, more obscured laterally. Mesonotal praescutum yellow with four brown stripes, intermediate pair confluent on posterior half, anteriorly with a conspicuous blackened central vitta, pseudosutural foveae and a comparable marginal spot darkened; scutum brownish gray, each lobe with two brown spots, central area paler brown; scutellum and mediotergite light gray with a scarcely indicated dark central vitta, parascutella yellow. Pleura and pleurotergite almost uniformly light gray, dorsopleural membrane obscure yellow. Halteres with stem elongate, light yellow, outer half of knob dark brown. Legs with coxae light gray, posterior pair more yellowed, trochanters yellow; remainder of legs brownish black to black, femoral bases yellowed, narrowest on fore pair where about one-sixth of segment is included; no pale subterminal ring as in allied species. Wings (Fig. 2) with costal cell almost uniformly brown, separated from the dark stigma by a whitened spot near outer end

of vein *Sc*; cell *Sc* light yellow with four brown areas that are less extensive than the ground, the first and fourth much smaller; remainder of ground yellowed, extensively clouded with pale brown, more extensive on outer half of wing and in anal cells; veins brown, yellow at arculus and in prearcular field, and in the interspaces of vein *R*. No trichia in wing cells or stigmal region; longitudinal veins beyond general level of origin of *Rs* with trichia, lacking on veins that enclose cell *1st M*₂. Venation: *R*₁₊₂ atrophied; petiole of cell *M*₁ and *m* subequal; cell *1st M*₂ large, narrowed outwardly; *m-cu* on *M*₁ shortly beyond origin, *M*₃₊₄ short; *m-cu* only a little shorter than distal section of vein *Cu*₁; cell *Cu* narrow throughout its length.

Abdomen obscure yellow, patterned with brown, the sternites more evidently so; basal segments, genital shield and valves of ovipositor clearer yellow.

HABITAT.— Mexico.

HOLOTYPE.— ♀. Lake Zempoala National Park, near Cuernavaca, Morelos, altitude about 10,000 feet, August 10, 1966 (M. E. Smith); in vegetation along shore of shallow lake in upland pine forest.

This species is dedicated to Dr. Marion Estelle Smith, of the entomological faculty of the University of Massachusetts. I am indebted to Dr. Smith for many undescribed species of crane flies from three different biotic regions of the earth, the Nearctic, Neotropical and the Ethiopian. The present fly is the most northerly known record for a species of the *macrotrichiata* group of the subgenus, the only other known Mexican member of the group being *Tipula* (*Eumicrotipula*) *obscuricincta* Alexander, from Chiapas and Guatemala. The latter has the pattern of the wings and legs quite distinct from the present fly which differs further in the venation, as shown. This new species is distinct from all known members of the group by the blackened femora and in the venation. The subgenus *Eumicrotipula* Alexander is the largest in the Neotropical region and has been discussed in some detail in three papers by the writer: *Bull. Mus. Hist. Nat. Paris*, 1922: 74-75; 1922. *Revista de Entomologia*, 17: 172-201; 1946. *Studia Entomologia*, 12: 212-234; 1969.

LIMONIINAE

Austrolimnophila (*Austrolimnophila*) *subsessilis*, n.sp.

Size medium (wing of female 9 mm); mesonotal praescutum obscure yellow with scarcely differentiated stripes, pleura and pleurotergite clear light yellow; legs brownish yellow to yellow; wings light brown, stigma darker brown, cell *M*₁ sessile to subsessile.

FEMALE.— Length about 9 mm; wing 9 mm; antenna about 1.2 mm.

Rostrum light yellow; first segment of palpus yellow, remainder brown. Antennae light brown, pedicel more yellowed. Head with front yellowish white, vertex with disk light brown, orbits paler.

Pronotal scutum chiefly yellow, restrictedly patterned with light brown, scutellum light yellow. Mesonotal praescutum obscure yel-

low, the three stripes scarcely differentiated; scutum obscure yellow, each lobe with a pale brown spot near mesal edge; posterior sclerites of notum obscure yellow. Pleura and pleurotergite clear light yellow. Halteres elongate, stem brownish yellow, knob brown. Legs with coxae and trochanters light yellow, remainder of legs brownish yellow to yellow; claws very small. Wings (Fig. 3) light brown, stigma darker brown; a pale brown longitudinal cloud over almost the entire length of cell R , broader and more evident beneath R_s ; veins brown, the trichia relatively short. Venation: Sc relatively short, Sc_1 ending nearly opposite fork of R_s ; R_{1+2} slightly longer than R_2 ; cell M_1 sessile on one wing of type, very short-petiolate on the other (as figured).

Abdomen with tergites light brown, sternites pale yellow.

HABITAT.— Guatemala.

HOLOTYPE.— ♀, Chicacao, El Naranjo, altitude 3800 feet, August 8, 1949 (T. H. Farr).

The only described generally similar regional species is *Austrolimnophila* (*Austrolimnophila*) *byersiana* Alexander, of Mexico, which differs in the coloration of the legs and wings and in the venation, notably the very long vein R_{1+2} and long petiole of cell M_1 .

Shannonomyia semireducta, n.sp.

Wings of female semiatrophied, about one-half the length of body; general coloration of head and thorax brownish gray, praescutal stripes not or scarcely indicated; knobs of halteres small, light brown; legs light to darker brown; wings very pale brown, prearcular and costal fields clear light yellow, stigma scarcely indicated.

FEMALE.— Length about 8.5-9 mm; wing 4.5-4.7 mm; antenna about 1.5-1.6 mm.

Rostrum dark brown, gray pruinose, palpi short, black. Antennae with scape and pedicel dark brown, flagellum black, the segments of latter oval to long-oval, with short verticils. Head brownish gray, unpatterned; anterior vertex broad, about three and one-half times the diameter of scape.

Pronotal scutum dark brownish gray, scutellum yellowish brown. Mesonotal praescutum almost uniformly dark gray or brownish gray; setae of praescutal interspaces sparse, yellow; scutal lobes brownish gray, central area and scutellum light gray, outer posterior angles of lobes and adjoining parts obscure yellow; postnotum light brown, sparsely pruinose. Pleura gray, dorsopleural region more buffy. Halteres with stem yellow, knob small, light brown or brownish yellow. Legs with coxae light brown, sparsely pruinose, trochanters obscure yellow; remainder of legs medium to dark brown, femoral bases restrictedly paler. Wings (Fig. 4) very pale brown, prearcular and costal fields clear light yellow, stigma scarcely indicated; wing base expanded above squama, with a small sclerotized blackened area, prearcular field long; veins very pale brown, yellowed in the brightened fields. Longitudinal veins beyond cord chiefly with trichia. R_s usually glabrous, in cases with a few scat-

tered trichia. Venation as shown; Sc_1 and Sc_2 subequal; R_2 beyond radial fork; $m-cu$ at near midlength of M_{3+4} .

Abdomen dark brown to blackish brown, the elongate cerci yellowed.

HABITAT.— Mexico.

HOLOTYPE.— ♀, Las Cruces National Park, Mexico D. F., on Route 15 between Mexico City and Toluca, 3100 meters, July 13, 1966 (O. S. Flint, Jr.); along small stream with shrubby banks in grassy meadow, as discussed further under *Tipula (Bellardina) flinti*. n.sp. PARATOPOTYPES. 6 ♀ ♀, with type.

The most similar regional species is *Shannonomyia ovaliformis* Alexander, likewise from Mexico, which differs from the present fly chiefly in colorational details. In this species the female remains unknown, the male having the wings of normal size.

Cheilotrichia (Empeda) tanneri. n.sp.

Mesonotal praescutum and scutum extensively polished black, posterior sclerites of notum paler, pleura yellowed, with a broad brownish black longitudinal stripe; femora conspicuously brownish black to black, bases narrowly yellowed; wings very weakly suffused, prearcular and costal fields light yellow; male hypopygium with dististyles yellow.

MALE.— Length about 3.3–3.3 mm; wing 3.8–4 mm.

FEMALE.— Length about 4.5–4.8 mm; wing 4.4–4.5 mm.

Rostrum and palpi black. Antennae black; proximal flagellar segments short-oval, outer ones more elongate. Head clear light gray; anterior vertex broad.

Prothorax and pretergites yellow. Mesonotal praescutum extensively polished black in front and sublaterally, the latter crossing the suture to include the lateral half of scutal lobe, the extreme margin of praescutum yellow; central areas of posterior praescutum and the scutum more chestnut brown; scutellum chestnut, parascutella light yellow, mediotergite slightly darker brown. Pleura, including dorso-pleural region, yellow, with a broad brownish black longitudinal stripe extending from fore coxae to abdomen, slightly paler behind. Halteres yellow. Legs with fore coxae as described, remaining coxae and all trochanters yellow; femora brownish black to black, bases narrowly yellowed, slightly more extensive on posterior pair; tibiae brown to yellowish brown, tips darker brown, more evident on posterior legs; tarsi dark brown to brownish black; legs with abundant relatively short dark setae and further exceedingly small setulae, without scales. Wings (Fig. 5) very weakly suffused, prearcular and costal fields light yellow, including the veins, remaining veins light brown. Venation: Sc_1 ending about opposite one-third to one-fourth Rs .

Abdominal tergites dark brown to black, sternites paler brown, more yellowed outwardly, genitalia of both sexes yellow. Male hypopygium (Fig. 9) with both dististyles, d , yellow, the inner style a gently curved blade.

HABITAT.— Panama.

HOLOTYPE.— ♂, El Volcan, Chiriqui, altitude 4200 feet, at light. May 25, 1954 (Gordon Field). ALLOTOPOTYPE, ♀, pinned with type. PARATOPOTYPES. 9 ♂ ♀, on five pins, with the types.

I take great pleasure in dedicating this fly to Professor Vasco M. Tanner, as a token of appreciation for his long years of dedicated service to many branches of zoology and as founder and chief supporter of the *Great Basin Naturalist*. The species is readily told from other regional members of the subgenus by the blackened femora and extensively polished black mesonotum.